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A CURIOUS PROTECTIVE DEVICE IN A LEPIDOPTEROUS LARVA.

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(PLATE IV.)

ON May 16th, 1900, one of the native collectors attached to the staff of the Sarawak Museum brought in from the jungle a great quantity of a *Spiræa*-like plant, which was to serve as food-material for some Nymphaline larvæ that had been collected a few days previously. The plant bore numerous cymose inflorescences which were still in bud and pale green in colour. A bunch of the plant had been laid on one side whilst the day's catch of insects was being overhauled, when it was noticed that one of the branchlets of an inflorescence was moving in rather a curious manner, since there was absolutely no breeze noticeable at the time. On closer examination it was found that the movement was due to a small Geometer caterpillar that had covered itself with buds cut from the inflorescence on which it was feeding. The caterpillar, which was only 9 millim. long, bore the following spine-like processes: a dorsal pair on the 4th segment, a dorso-lateral pair on segments 5, 6, and 7, a lateral pair on the 8th segment, and a short dorsal pair on the 11th; there were also some small tubercles in the positions

shown in the accompanying sketch. To these spines strings of buds were attached by silk, the buds themselves being fastened to each other by silk. The buds were all green and fresh, and it was quite obvious, after a few days' observation, that the caterpillar took care to provide itself with a new supply whenever the old one withered and turned brown, for strings of such brown and withered buds were frequently found below the food-plant, whilst the caterpillar itself was nearly always covered with fresh green specimens. Once or twice the experiment of removing by hand all the buds from the caterpillar was tried, and in every case the larva at once set to work to cover itself again; a bud would be shorn off with the mandibles, then held in the two front pairs of legs, and covered all over with silk issuing from the mouth of the larva; the larva then twisted round the anterior part of the body, and attached with silk the bud to one of the spinous processes; another bud would then be attached to this, and so on, until a sufficiently long string (generally three or four buds) was made, when operations on another spine would be commenced.

The larva fed on the buds of the inflorescence, scooping out the interior and leaving an empty shell; with its head and perhaps two thoracic segments buried in a bud, it presented a comical appearance, reminding a non-entomological friend of a cat with its head in a milk-jug. Very often the empty shell would not be dropped, but attached to a spine; in fact, on some days it was noticed that there were more shells attached to the spines than buds, and it was only under the unnatural conditions induced by the experiments above noted that the larva hastened to cover itself entirely with uneaten buds; the empty shells naturally withered more quickly than the buds.

When irritated the larva curled up in the attitude represented in the sketch, and it would remain in this position for fifteen to twenty minutes; it rarely moved much about, but when it did, it was with a curious swaying motion, which may have been part of the protective design, since it then looked like a branchlet blown by a breeze, or else the insect was top-heavy with the superposed buds.

The larva pupated on the 28th, spinning up a silk cocoon



covered with green buds; but it unfortunately fell a prey to those ubiquitous enemies of pupæ in the tropics—ants; and, as another specimen was never discovered, in spite of vigorous searchings through bushels of the food-plant, the ultimate form of the larva must for the present remain a mystery. In spite of a wonderfully deceptive resemblance to a vegetable growth, the larva must be nevertheless extremely rare.

ON THE VARIATION OF THE BEAN-GOOSE
(*ANSER FABALIS*).

BY EINAR LÖNNBERG, C.M.Z.S., &c.

IN 'The Zoologist' (*ante*, p. 41), Mr. Frohawk has published an article on "British Bean-Geese," in which he endeavours to establish as a fact that there are two kinds of Bean-Geese entitled to specific rank. As I had some doubt about the validity of these so-called "species," I made up my mind to compare some Bean-Geese with the diagnoses which Mr. Frohawk has supplied in his communication to this Journal. Unfortunately we have had unfavourable weather for Goose-hunting this spring. Thanks to the kind assistance of several gentlemen, I have, however, had the pleasure of receiving for comparison eight freshly killed Bean-Geese, all shot in the vicinity of Upsala. In addition to these I have had at my disposition four preserved specimens* belonging to the Zoological Museum of the University of Upsala, near which town they had been killed. It is therefore with a dozen specimens that I propose making a comparison with Mr. Frohawk's diagnoses. It would, of course, have been desirable to have had a still larger series of fresh specimens, but it seems that this material is sufficient for a quite interesting and instructive comparison.

Mr. Frohawk characterizes his two "species" approximately in the following manner:—" *Anser segetum*." — Bill: average length of culmen about $2\frac{1}{2}$ in., that is, approximately 59 mm.; nail large and elliptical, included in the total length of culmen three and a half times; colour black, typically with only an orange band between the nail and the nostrils; but in this respect some variation is admitted, so that the orange sometimes extends below the nostril. Culmen considerably

* In addition to these I have studied some more preserved specimens, but, as they agreed with the others, I did not think it necessary to consider them here.

curved; average number of laminae along each edge of upper mandible from 20 to 21, but sometimes as many as 24. As a rule no white feathers at the base of the bill, excepting in old birds, in which a small frontal patch of greyish white may occur.

"*Anser arvensis*."—Bill: length of culmen rather over $2\frac{1}{2}$ in., that is, approximately 63–64 mm.; nail proportionately small and rounded, included in the total length of culmen four and a half times. "Orange colour extending nearly over the whole of the upper mandible, having only a black bar commencing in front of the nostrils and running along the culmen to the base, where it becomes paler." Culmen straighter than that of "*segetum*"; average number of laminae about 28. A conspicuous band of white feathers extending along the whole basal edge of upper mandible.

Mr. Frohawk thus bases the difference between his two species principally on the following six points:—

1. Different length of bill.
2. Different proportions of the nail compared with the length of culmen.
3. Different degree of distribution of orange on the upper mandible.
4. Different number of laminae in the upper mandible.
5. Absence or presence of a white feathered band along the base of the upper mandible.
6. Different upper outline of culmen.

If we now proceed to make a comparison with the twelve Swedish specimens of Bean-Geese shot during the spring migration near Upsala, it will be best to consider the different characteristics one after the other. The first thing to do is to arrange the birds in accordance with the length of their bills (culmen), and to make the matter easier I propose to name the specimens with letters *a* to *m*. The length of the culmen is then in *a*=56, *b*=57, *c*=58, *d*=59, *e*=59, *f*=61, *g*=62,* *h*=62, *i*=62, *k*=63, *l*=64, and *m*=68 mm. A considerable variation is thus apparent. According to this measurement specimens *d* and *e* should be "*segetum*"; *a*, *b*, and *c* have a shorter bill than the typical "*segetum*" ought to have; *a* being even almost as much shorter than the typical "*segetum*," as the latter

* *g* is the male and *e* the female of the same pair.

should be shorter than "*arvensis*." Specimens *f*, *g*, *h*, and *i* should be intermediate between "*segetum*" and "*arvensis*"; *k* and *l* should agree with "*arvensis*," but *m* is rather long even for "*arvensis*," and as distant from the typical "*arvensis*" as the same should be from "*segetum*." All the twelve specimens form such a continuous series that it is impossible to make differences of any importance with regard to this characteristic.

If we now turn to point 2, it is true that specimen *a* with the shortest bill has comparatively the largest nail, which is contained only $3\frac{1}{2}$ times in the length of the culmen. But next to this, one does not come to any short-billed ($=$ "*segetum*") specimen; on the contrary, the two longest-billed ones, specimens *l* and *m*, are most "*segetum*"-like in this respect, with a nail contained $3\frac{1}{2}$ times in the culmen. Then comes specimen *b* with $3\frac{5}{8}$, specimens *d* and *i* are alike with $3\frac{3}{4}$; then specimens *f* and *k* with $3\frac{1}{2}$, *e* with $3\frac{5}{8}$, and finally specimens *c*, *g*, and *h* with 4 times. In the greatest number of these specimens the proportions of the nail compared with the length of the culmen are intermediate between those that should be characteristic for Mr. Frohawk's "*segetum*" and "*arvensis*." In none of these specimens is the relation between nail and bill the same as it ought to be in "*arvensis*," and the size of the nail evidently does not stand in any such relation to the length of the bill as to enable any grouping of the individuals round two centres, each representing a different race, still less a species. It has already been remarked that the two longest-billed specimens exhibit such characteristics in this respect as, according to Mr. Frohawk, ought to belong to the short-billed form.

With regard to the distribution of the orange on the bill, a similar confusion makes itself apparent. The shortest-billed specimen *a* has the whole upper mandible orange, except the nail and a longitudinal bar on the culmen, which are black. Although short-billed it agrees in this respect best with Mr. Frohawk's "*arvensis*." Specimen *d* is again most "*segetum*"-like, as in this the orange hardly extends under the anterior end of the nostrils. Next to this comes the longest-billed specimen *m*, in which the orange extends as a narrow band along the lower edge of the upper mandible. In specimen *c* this band extends all the way to the feathered portion. In specimens *e* and *g* this orange band

under the nostrils is broader, but does not extend so far back as to the feathered portion, but it does so in specimen *f*. In specimens *b*, *h*, *i*, and *k* the orange extends broadly backward under the nostrils along the lower edge of the upper mandible, but in addition to this there are large blotches, more or less defined, of the same colour behind the nostrils. Specimen *l* comes next to *a* in its likeness to "*arvensis*," as the black extends from the culmen downwards only to the nostril, otherwise the whole upper mandible (except the nail) is orange. It has thus evidently no relation between the distribution of the colour of the bill and the other characteristics, and nothing indicating racial or specific differences. The variation of the colours of the bill might sometimes be still greater, as Mr. Kolthoff has told me from his rich experience, that he has shot Bean-Geese with almost the whole bill black, and others with the whole bill—except the nail, orange.

If we now consider the number of laminæ of the upper mandible, the smallest number is found in the short-billed but "*arvensis*"-coloured specimen *a*, viz. 22 on one and 23 on the other side; 23 laminæ are also found in the long-billed specimen *l*, 24 in *b*, 25 in *c* and *f*, 27 in *h*, 28 in *d* and *m*, 29 in *g*, *i*, and *k*. The largest number—30 on one and 31 on the other side—is found in specimen *e*. Within the limits of the variation of "*segetum*" thus come the short-billed *a* and *b*, and the long-billed *l*; several are intermediate (*c*, *f*, and *h*), but the others might be termed "*arvensis*"-like.

Concerning the development of the white feathers at the base of the bill, the most short-billed specimen *a* is most "*arvensis*"-like, having a broad continuous basal band. A similar narrow band is present in specimen *l*, with a bill of "*arvensis*" length. But, on the other hand, the rather long-billed specimen *h* has not one white feather, and is thus "*segetum*"-like. In *f* there are some very few white feathers, but not so many as to form patches. In all the others there is a small frontal and still smaller lateral white patch at either side of the base of the upper mandible. In specimens *e*, *g*, *k*, and *b* these are very little developed, somewhat better in *c*, *i*, and *m*, and almost confluent in *d*. The more or less great development of white feathers at the base of the bill cannot denote any division

in different species. While discussing this characteristic and its variability I may add that last spring I saw a Bean-Goose in which the orange-coloured lipochrome of the bill had immersed the otherwise white feathers at the base of the bill in such a manner that this Goose possessed an orange-coloured feathered band along the base of the upper mandible.

The outline of the bill of the Bean-Goose is variable, but it does not always vary in accordance with the diagnostic rules of Mr. Frohawk. For instance, the culmen of the long-billed specimens *m* and *g* is more convex than in any of the others, and the short-billed specimen *c* has a rather strongly concave outline of its culmen.

The following table will facilitate the understanding of the distribution of the five first-mentioned characteristics among these twelve Bean-Geese, if "s" means "*segetum*"-like, "a" = "*arvensis*"-like, and "i" = intermediate, with the letter between parentheses indicating in which direction the variation tends to go. The sixth characteristic is left out, as being rather arbitrary:

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>k</i>	<i>l</i>	<i>m</i>
1.	<s	<s	<s	s	s	i	i	i	i	a	a	>a
2.	<s*	>s	i	i(s)	i	i(s)	i	i	i(s)	i(s)	s	s
3.	a	i(a)	i	s	i	i	i	i(a)	i(a)	i(a)	i(a)	i(s)
4.	>s	>s	i(>s)	a	>a	i(>s)	a	i(<a)	a	a	>s	a
5.	a	i	i	i(a)	i(s)	s(i)	i(s)	s	i	i	a(i)	i

From this table it may be seen that the intermediate characteristics are most common, and that the others are distributed in such a manner at both ends of the series, as well as in the middle, that it seems quite impossible to divide the specimens in two specific or even racial groups with the aid of these characteristics. I think accordingly that the conclusion may be drawn from this comparison that it is impossible to maintain two such species as *Anser segetum* and *A. arvensis* according to Mr. Frohawk's definition, because there are to be found all kinds of intergrading and connecting specimens.

The great variability of the Geese has long been known, and it is possible that the great variation found in these birds can be explained partly by their habit of mating for lifetime (which

* The nail larger, but the number expressing the relationship smaller, than in "*segetum*."

lessens the panmixie), and partly by their strength and intellectual faculties. It is therefore evident that a slight variation in one or the other direction is of less importance for such strong, intelligent, and watchful birds as the Geese than for weaker birds not possessing so many qualities useful in the struggle for life. It is also possible, and even probable, that through isolation some divergences may be fixed, and geographical races, subspecies, &c., originate, or have already done so.*

The variation of these birds is therefore well worth study, especially in connection with geographical distribution and biology, but the infinite splitting in "species," which cannot be separated by any valid characteristics, does not do much good.

Upsala.

* *Anser brachyrhynchus* breeding in Spitzbergen is, for instance, a quite distinct species, although related to the Bean-Goose, but now differing from it in exterior as well as skeletal characters. Sushkin's *A. neglectus* might be another.

BIRD NOTES FROM CHESHIRE DURING THE WINTER OF 1902-1903.

By T. A. COWARD.

IN spite of the mildness of the weather in the winter of 1902-1903 some interesting birds visited Cheshire, and possibly also the absence of a prolonged frost accounted for the lengthy stay of some of the more unusual visitors. It is not my intention in this paper to give a diary of the winter months, but only to record the occurrence of a few of the more noteworthy birds. The Knot which was picked up at Bowdon on Oct. 24th has already been mentioned in this paper (*ante*, 1902, p. 467), and the Pomatorhine Skua and Gannet, which were obtained respectively at Saughall and Queen's Ferry in October, were recorded by Mr. A. Newstead ('Field,' Oct. 25th, 1902).

For more than a week in the first half of October an immature Cormorant frequented Redes Mere, a sheet of water over twenty miles from the nearest tidal estuary; and another, a little later, was reported from Great Budworth. Early in the month a Cormorant was shot on the Mersey near Warrington, but this is not so unusual, for the bird not infrequently ascends the rivers for some distance.

A Bittern was observed on the margin of Budworth Mere at the end of November, and was seen many times during the following three months. It generally frequented a dense reed-bed, but was observed in other places round the banks, often crouching amongst the litter of dead reed-stems which marks the highest point reached by the water. Amongst these brown withered reeds its colouring rendered it inconspicuous. After several unsuccessful searches I succeeded in flushing it from the reed-bed; it did not rise until I was about five yards away from it, and then it flew with a loose heavy flight along the margin of the mere, barely topping the reeds, its long green legs dangling and its head only partially drawn back. A few days later Mr.

C. Oldham found it near the same spot; it was about three yards away from him when it rose. This time, after flapping across the reeds, it gathered up its legs behind it, drew in its neck, and crossed the mere, flying like a Heron. When the hounds met at Marbury on Feb. 14th they drew the reed-bed, and again disturbed the bird, but probably owing to the number of people on the banks it did not cross the water, but simply moved out of the way of the dogs, crouching down again at once. Four days later (the 19th) was the last date on which it was noticed. The gamekeeper and others at Great Budworth are to be congratulated that the bird was able to stay so long without being shot.

On Dec. 14th Mr. Oldham saw an old male Goosander with the Ducks on Tatton Mere, and on the 17th I went to look for the bird, and found it in company with another—a brown-headed bird. They swam apart from the other fowl—Mallards, Tufted Ducks, and Pochards—and after a time got upon the wing, flying to a part of the lake where I obtained a still better view, being near enough to see the rosy tinge upon the breast of the old drake. The brown-headed bird—a female or young male—dived much more frequently than the old male; I timed some of the dives, and found that they varied from a little under half a minute to one minute forty seconds. Once one of the birds—I think the old drake—uttered a long harsh “karr,” but this was the only time we heard any of the birds utter any sound, though we watched them many times during December, January, and February. A few days later we again carefully timed the duration of the dives; as a rule they only lasted for from seventeen to twenty seconds, but once again we found the old male remained beneath the water for a hundred seconds.

On Dec. 27th there were two green-headed males and three brown-headed birds on Tatton, and at the same time there were a couple of Goosanders, too far away to distinguish their colours, on the neighbouring mere at Rostherne. Tatton Mere was frozen over during the frost in January, and though we visited Rostherne, which remained open water, we failed to find the Goosanders, but on such an extensive sheet of water, and amongst a great crowd of fowl, it is quite possible that we missed them. When the thaw came the birds returned to the former haunt,

but we missed from amongst them the oldest drake, a bird which showed a great deal of white when it flew; it is not improbable that it had been shot, for by this time the birds were getting very shy and wild, as if they had been fired at.

It was not until the end of January that we discovered that at least eight Goosanders had been in the neighbourhood. On the 24th of that month we watched at close quarters six brown-headed birds fishing in a narrow portion of the mere, and two of the birds we had seen previously had been green-headed adult males. The portion of the mere where the birds were feeding is separated from the main sheet by a shallow strait; it is in fact a sort of subsidiary pond. In the shallows the small fish were jumping, no doubt frightened by the assaults of the birds. Often five Goosanders were below the surface at once, and the water was churned into swirls and eddies above them. At last one of the birds saw us, and immediately submerged its body leaving only its head and neck above the surface. Then it rose followed by the others, but without a sound, save the splashing of their wings and feet as they crossed the pond. Clearing the water they swung round and again passed close to us, near enough to reveal the detail of their plumage. During the earlier part of their stay the Goosanders kept apart from the Mallards, but later they often swam in company with the other Ducks, and it was no unusual thing to see them standing or resting on the grass of the bank amongst a large party of Mallards. When this was the case, however, the Goosanders were always close together, and not scattered amongst the other birds. On the 1st of March we saw them on the water for the last time. A week later there were no signs of Goosanders on Tatton.

On Dec. 26th, Mr. C. Oldham, Mr. F. Brownsword, and I obtained an excellent view of a Little Gull as it rose from the edge of the Manchester Ship Canal between Eastham and Ellesmere Port. Its flight was desultory and strikingly different from that of the Black-headed Gulls, with which, though there were many in its immediate neighbourhood, it was not con-sorting. It flew slowly up the canal, and then down again, twice passing within a few yards of where we were standing on the bank; it gave us an opportunity of observing it both from above,

when it flew near the water, and from below, when it passed just above our level. Its size, the roundness of its wings, the dark markings on its nape, and the very dark colouring on the under surface of its wings were noticeable, but what struck us most was the entire absence of black upon the primaries and upper surface of the wings when seen from above. The tail was quite white and the legs bright red. Judging by the pureness of its grey mantle and the absence of a tail-bar, it was an adult bird.

Gulls, as usual, occurred inland in some numbers. We met with no Great Black-backed Gulls away from the tidal waters, though we saw a few on both the Dee and Mersey estuaries. Black-headed Gulls are now so common on the inland waters that the presence of fifty or sixty at a time is hardly worthy of special notice. At all seasons of the year this semi-marine bird is to be met with on some of the meres and "flashes," and it is frequently abundant on flooded meadows and in the fields of Cheshire. From time to time mature and immature Herring-Gulls and Lesser Black-backs visited the different waters, and Common Gulls were not infrequent. Two, and for a time four, frequented Tatton from the end of November until March.

There were perhaps not so many winter Ducks upon the inland waters as usual; the numbers of the different species fluctuated considerably, but in such a well-watered county the birds undoubtedly move from mere to mere, so that it is unsafe to say that only certain species are present at any particular time. Mallards, in considerable numbers, use the meres as diurnal resting-places; early in October the flocks began to frequent the waters; in February and March their numbers decreased. At the end of November there were perhaps five hundred Mallards regularly on Tatton; and on Jan. 17th, during the short but hard frost, when Rostherne was practically the only open water, the surface of this mere was dotted by thousands of wildfowl, the great majority of which were Mallards.

Throughout the whole season we only met with a single Shoveler, a drake which consorted with the Mallards on Budworth during the second week in December. The rarity of this Duck is noticeable, for in the winter of 1901-1902 there were frequently one or two with the Mallards on both Tatton and Budworth meres.

Teal, singly or in twos or threes, accompanied the larger Ducks all through the winter; quite early in the season we met with them at Tatton, and on Budworth and other waters they were present. Even when the light was so poor that we could not distinguish the little birds, we could tell that they were present when we heard the short sharp "krit" amongst the loud quacks of the Mallards. On the 19th of March I flushed thirteen Teal from a secluded reed-fringed pond near Knutsford, on an estate where for many years Teal have bred in safety.

Wigeon were never numerous, but odd birds turned up from time to time on different waters, and they were reported as being abundant in the estuaries; it should, however, be borne in mind that amongst wildfowlers the name "wigeon" is applied to many species of Ducks.

The Diving Ducks were somewhat late in appearing; it was not until Nov. 2nd that we saw a couple of Tufted Ducks on Tatton Mere. Later in the same month Mr. F. S. Graves saw a mixed flock of Tufteds and Pochards on Redes Mere; he calculated that it numbered upwards of sixty birds. Early in December, when Tatton Mere was half frozen over, some thirty Pochards and a single Tufted Duck were noted, and about the same time flocks of perhaps eighty Pochards and thirty Tufted Ducks frequented Budworth Mere. Later in December we saw a considerable number of Pochards, but no Tufteds, on Tatton and Rostherne, but early in January both species were present on Budworth. A little later—on Jan. 10th—there were from seventy to eighty Tufteds and perhaps twenty Pochards at Tatton, but four days after this there was not a single Tufted Duck on Budworth, although there were quite one hundred and fifty Pochards. Many of these birds remained on a small patch of open water on this mere when the rest of the water was given up to skaters. On Rostherne on the 17th, when Mallards were so abundant, both Pochards and Tufted Ducks were present in some hundreds.

After the thaw both species of Diving Duck visited Budworth, and there were a few Tufteds on Tatton. Early in February the numbers of these Ducks became still more irregular, seven or eight Tufteds and a single Pochard being all that I could see on Budworth on the 5th and 18th; while at the beginning of March,

though there were none on the big mere at Tatton, there were over sixty Tufteds on the smaller and more secluded pool at Booths. On March 14th, however, when the flocks of Mallards on Tatton had dwindled down to some fifty birds, there were perhaps one hundred Tufteds, but we failed to distinguish a single Pochard.

One or two small parties of Golden-eyes spent some time on different waters, and in every case they were noticeably shy, flying even sooner than the nervous Mallards. Four or five were present on Budworth in the second week of December, and early in January we noticed four on this water and four on Oakmere. All these birds were either females or immature males.

During February and March several flocks of Siskins were seen in different parts of the county. Parties frequented the alders at Tabley, Chelford, and Heron Bridge near Chester, and in the neighbourhood of Capesthorpe they were seen at Old Alderley, Monk's Heath, Redes Mere, and Siddington. Some of these last-named flocks may, of course, have been the same birds in different places, but the other situations where they were noticed are widely separated. On March 25th Mr. S. G. Cummings and I watched a large flock of Siskins in the fir-woods at Burton in Wirral. The birds, the great majority of which were males, were feeding amongst the slender branches of a clump of larches. We could not be quite certain what they were feeding upon, but it appeared to be the buds. Four days later Mr. Oldham saw a single Siskin at Tabley, close to the spot where flocks had been noticed several times earlier in the year.

Bramblings were more plentiful than usual. The largest flock we saw frequented some beech-trees that lined a country lane near Goostrey; here they several times far outnumbered the Chaffinches, which were also feeding on the beech-mast.

A few Jack-Snipe turned up during the frost, and on Dec. 7th Mr. Oldham put up a Sanderling from the border of Budworth Mere. The bird moved about from place to place, keeping, however, to the margin of the mere, and Mr. Oldham had several opportunities of examining it at fairly close quarters.

THE BIRDS OF N.W. WALES AND THE OPPOSITE COUNTIES OF IRELAND.

BY H. E. FORREST.

IN 'The Zoologist' for 1902, p. 17, Mr. Aplin compared the avifauna of Bardsey and Lambay islands, situated nearly opposite one another on the Welsh and Irish coasts respectively, and concluded that, with certain exceptions, the two were similar. On reading this paper it occurred to me that a comparison of the birds of Western Wales with those of the opposite coast of Ireland might prove interesting. Having been engaged for some years in collecting materials for a work on the Vertebrates of North Wales, I had ample details regarding Merioneth, Carnarvon, and Anglesey, whilst Irish records might be compiled from the 'Birds of Ireland.'

A glance at the map showed that the Irish counties opposite our Welsh district were Dublin, Wicklow, and part of Wexford; but as the isothermal lines in Ireland are further north than in Wales, it seemed that the comparison would be fairer if Wexford were omitted, although by so doing we should eliminate the district most favoured by migrants on arrival in Ireland.

This paper then deals, on the one hand, with the counties of Merioneth, Carnarvon, and Anglesey (=W.), and on the other with those of Wicklow and Dublin (=I.). It is confined to a brief statement of facts, and does not attempt to account for the many surprising differences in the respective avifaunas. As regards the statements themselves, the Welsh are derived from my own note-books, and are the outcome of notes contributed by nearly one hundred observers, to whom I render my sincere thanks. The Irish are abstracted from the 'Birds of Ireland,' and have been kindly revised by Mr. R. J. Ussher. It is fitting that acknowledgment should be made of the valuable services rendered to Irish ornithology by Mr. R. M. Barrington, who, by long-continued observations conducted at his own expense at all the principal Irish lighthouses, has amassed and reduced to order

an enormous amount of detail on the migration of birds, besides adding several very rare species to the fauna. It is chiefly owing to him that the Pied Flycatcher finds a place in the Irish list, while the Lesser Whitethroat and several other birds have thus been added to it.

As it would take too much space to deal with every species, I omit all those which are very rare, as well as those which are equally common in both districts. In this way the whole of the Thrushes may be disposed of as being common in both, though, curiously enough, the Mistle-Thrush only colonized Ireland during the last century.

WHINCHAT.—W. Fairly common, but somewhat local. I. Much less numerous; a few breed in both counties.

REDSTART.—W. Common in the wooded districts. I. Very scarce and local; a very few breed in Wicklow.

BLACK REDSTART.—W. Recorded three times only. I. Probably visits south and east coasts annually on migration.

LESSER WHITETHROAT.—W. Local. Occurs in the eastern parts of Merioneth and Carnarvon, but apparently not on the west coast. I. Almost unknown; has occurred twice on migration, in Donegal and Kerry.

BLACKCAP.—W. Common and generally distributed in all suitable districts.* I. Rare generally, but occurs in parts of Wicklow and Dublin, and is increasing.

GARDEN WARBLER.—W. Generally less numerous than the Blackcap, and more local, but occurs in most wooded districts, and is plentiful in some. I. Very local, and has not been known to breed in Wicklow or Dublin.

WOOD WARBLER.—W. Exceedingly numerous in the wooded parts of Western Wales. I. Very rare and local; a regular but very scarce summer visitant to Wicklow.

REED WARBLER.—W. Very local in district, but has been identified in several places in Carnarvonshire, whilst the nest has been found three times. I. No reliable evidence of its occurrence in Ireland.

* Anglesey is singularly devoid of woods, so that this and other woodland species are comparatively few. Still I have met with the Blackcap there, and several other Warblers—the Sedge-Warbler and Whitethroat—abound.

MARSH TIT.—W. Somewhat unequal in distribution, but common in many districts; rare on west coast. I. No authentic record during last fifty years, nor is there any Irish specimen in existence.

NUTHATCH.—W. Very common in Montgomeryshire, but rare elsewhere, and almost unknown on the west coast. I. Unknown.

WHITE WAGTAIL.—W. A regular spring migrant, passing up the west coast, but seldom remaining to breed. I. Migrant up the west coast of Ireland; neither known to visit Wicklow nor Dublin.

YELLOW WAGTAIL.—W. Not uncommon as a summer visitant, breeding in the east of Carnarvon and Merioneth, but on the west coast known chiefly as a passing migrant. I. Extremely local; nest found once near Dublin.

TREE-PIBIT.—W. In spite of repeated assertions to the contrary, the Tree-Pipit is quite a common bird in all the wooded parts of North Wales, and I have also met with it on open land where there were no trees, and even seen a dead one near the top of Snowdon. I. No sufficient evidence from any part of Ireland.

PIED FLYCATCHER.—W. Surprisingly numerous in Carnarvon and Merioneth, breeding in all suitable woods. I. Never known to breed; has occurred seven or eight times at certain light-houses on the autumn migration; and once in April, in Co. Sligo.

RED-BACKED SHRIKE.—W. Generally distributed, though not numerous. I. Only once obtained in Ireland—in Co. Down.

HAWFINCH.—W. Slowly spreading westward, but as yet rare in Merioneth; unknown on the west coast, in Anglesey, or Carnarvon except near Llandudno. I. Known as a scarce winter visitor, but believed to have nested recently in Co. Dublin.

SISKIN.—W. A winter visitor of uncertain occurrence, but said to have nested once in Carnarvonshire. I. Much commoner in Ireland; resident, and breeds in both counties in fair numbers.

TWITE.—W. Appears occasionally in flocks between autumn and spring, but seldom if ever breeds. I. Common resident, breeding in both counties.

TREE-SPARROW.—W. Occurs in scattered localities in Anglesey and Carnarvon, but has not been identified in Merioneth. I. Almost unknown except near Dublin, where there is an increasing colony established some fifty years ago.

CROSSBILL.—W. An irregular winter visitor, said to have nested once in Carnarvonshire. I. Much more common and resident; believed to nest in both counties.

GIRL BUNTING.—W. Occurs in many scattered localities, and is resident. I. Unknown, except by report of one seen.

STARLING.—W. Very numerous, resident, and increasing. Migrational movements on a large scale occur on the west coast between autumn and spring. I. Numerous and increasing, but only established as a breeding species within comparatively recent years. Its numbers are greatly swelled in winter by immigrants.

CARRION CROW.—W. Extremely numerous in the mountainous districts, especially in Merioneth, where it is to a great extent gregarious. I. Almost unknown in Ireland; a very few may survive on the coasts of Cork and Mayo.

HOODED CROW.—W. A rare casual winter visitor, and particularly scarce on the west coast. I. *The Crow of Ireland*, common and resident, breeding in both counties.

JAY.—W. Generally distributed and common in wooded districts unless its numbers are artificially reduced. I. Very local; breeds in increasing numbers in West Wexford, but rare in Wicklow and Dublin. Its range is almost confined to certain river basins. Outside this area it is practically unknown.

CHOUGH.—W. Formerly common, and used to breed all along the coast, but is decreasing rapidly. Most of its old haunts are deserted, so that it is now almost confined to certain parts where the coast is precipitous. It bred in Merioneth and Anglesey up to quite recent years, and there are possibly still a very few pairs on those coasts. I. Used to breed on the coasts of Wexford and Dublin, but has ceased to do so. It is still common, however, in many other parts of Ireland.

GREAT SPOTTED WOODPECKER.—W. Fairly common and generally distributed in wooded districts. I. An accidental straggler only, recorded twice in Wicklow and twice in Dublin.

LESSER SPOTTED WOODPECKER.—W. Rather rare and local. Occurs in East Merioneth, but not on the west coast. I. Two recorded in Wicklow many years ago, none since. No specimen exists.

GREEN WOODPECKER.—W. Occurs throughout the district;

more numerous in the eastern than the western part. I. Not recorded in either of the two counties; only three instances in Ireland.

TAWNY OWL.—W. This is the commonest and most generally distributed of the Owls in Wales, and numerous in the west. I. Unknown, a bird shot in Co. Down, Nov. 19th, 1900, having proved to be introduced.

COMMON BUZZARD.—W. Resident and breeds in fair numbers in the wilder parts of Merioneth and Carnarvon, nesting both on cliff-ledges and in trees. I. Now only a casual visitor, though it bred in the north up to twenty years ago.

ROUGH-LEGGED BUZZARD.—W. Rather rare winter visitant, chiefly to East Merioneth. I. Much rarer; only recorded once in the two counties.

STOCK-DOVE.—W. Common and generally distributed; particularly affects the coast, and breeds both in cliffs and burrows in sandhills. I. Increasing, especially in Wicklow, but was unknown in Ireland prior to 1875.

TURTLE-DOVE.—W. Not uncommon as a summer visitant in the eastern part of North Wales, and is increasing and extending its range westwards. On the west coast it is just establishing itself, though as yet very rare. I. Occurs irregularly on spring and autumn migrations, but there is no satisfactory evidence of its breeding.

BLACK GROUSE.—W. Seems to have a precarious footing in Wales, though it keeps turning up in unexpected places. Attempts to introduce it in fresh localities almost always fail. I. Unknown except where introduced; soon dies out.

DOTTEREL.—W. Rare, but occurs on some of the western mountains during the spring migration. I. Very rare; not recorded in either county.

WOODCOCK.—W. Occurs in considerable numbers, but rarely nests. I. More plentiful; nests in both counties.

RUFF.—W. Only recorded three or four times. I. Recorded thirteen times in the two counties.

COMMON GULL.—W. Fairly plentiful from autumn to spring, but never stays to breed. I. Does not nest in Wicklow or Dublin, but has several breeding stations in the north and west, as well as one on an island off Kerry—its southernmost breeding limit in Europe.

STORM-PETREL.—W. Occurs in small numbers on the west coast during rough weather, generally in autumn. I. More common in Ireland; breeds in the west, but not in our two counties.

BLACK GUILLEMOT.—W. Said to have bred on the Orme's Head a century ago, but never does so now, and is indeed but a rare straggler nowadays to North Wales. I. Breeds in small numbers on the Dublin coast, less numerous in Wicklow. It is more often met with in the north and west.

It is impossible to read the foregoing without wondering what can be the causes which have produced such wide discrepancies in the faunas of two districts so near together, and so similar in climatic conditions. In the case of a sedentary species such as one of the Woodpeckers we can understand fifty miles of sea acting as a barrier; but if we take the case of a regular migrant such as the Tree-Pipit, it seems passing strange that no individual of the species—so common on the one side of the Channel—should ever find its way across the water to the Emerald Isle. Here is, indeed, ample scope for study and reflection.

THE MOLLUSCA OF THE GREAT YARMOUTH DISTRICT.

BY A. PATTERSON.

UNTIL very recent years the Mollusca of the Yarmouth District, like the invertebrates in general, have received very little attention at the hands of local naturalists. Mr. J. B. Beckett (now of Lynn) in 1889 drew up what was the first authentic list, in which nearly eighty species are enumerated, covering his researches for the previous two or three years among the marine and other animals of this order. I myself have not so fully studied the species, and have in consequence entered largely into the "findings" of Mr. Beckett, and have also had access to the lists of one or two other county naturalists.

The Mollusca, especially the marine species, are not advantageously studied without some trouble on the part of the investigator, so few comparatively being found on our flat sandy shore, and then but mostly as broken fragments of shells; and he must needs go afloat with dredge and proper apparatus to secure the various species found frequenting the roadstead. I have persuaded shrimpers to help a little in this matter, but, as in the case of crustaceans, they either do not trouble, or have not time to preserve "finds," or even should anything more than usually attract their attention it is laid aside and afterwards forgotten, or more often the remark is passed, "I chucked it away, seein' as you didn't come round for it."

I have to thank Mr. F. W. Harmer, F.G.S., for a ticked list of species found by himself and his son, Dr. S. F. Harmer, of Cambridge, during a day or two's dredging in the neighbourhood of Yarmouth and Lowestoft, when they met with nearly forty species.

The Cephalopods are uncertain visitors, except in the case of the Little Squid (*Sepolia Rondeletii*), which is most abundant here in the summer months.

The Fresh-water Mollusca, of course, and those peculiar to the marshy district, are less difficult of study, and if more systematically worked "it is probable," say the Messrs. Paget in their 'Sketch of the Natural History of Great Yarmouth,' "that novelties would be met with in our salt marsh-ditches, in many of which the weeds are covered with a variety of shells, which could scarcely fail to be productive of interest."

The list below will, for the purpose of those who may hereafter more diligently pursue the subject, be of some use, inasmuch as it will form a basis on which to continue investigation and observation. It must be understood that the area worked has been confined exclusively to the immediate neighbourhood of Great Yarmouth.

As far as possible I have added the local status of the various species, which the following abbreviations will make sufficiently plain:—C., common; A., accidental; O., occasional; N. C., not common; F., frequent; B., J. B. Beckett; H., F. W. Harmer.

MARINE BIVALVES.

Ostrea edulis, Linn. Oyster.—O. During the palmier days of the local trawl fishery many "trunks" full of very large coarse-shelled Oysters were brought to the fish-wharf, the shells being rough and distorted, and exceedingly thick, in many cases perforated with hundreds of worm-borings, and covered with *Actinia*, *Serpula*, and Zoophytes. This Oyster is a coarse rank-tasting morsel, and known vulgarly as the "Smack-Oyster," in distinguishing it from the smaller, better-flavoured, cultivated mollusc—the "real native," and other brands. On occasion I have known anchors brought to the surface covered with Oysters of all ages and sizes. Our roadstead, however, with its strong tides and "live" sand, is not conducive to the well-being of spat or the juvenile Oyster. Many years ago a bed was discovered between Yarmouth and Lowestoft, but was soon worked completely out.

Pecten varius, Linn. Pecten.—N. C. "A few specimens north of Britannia Pier" (B). Single valves of this and *P. opercularis* are occasionally washed up on the beach, and the shrimpers take small examples.

P. opercularis, Linn.—O. "Common near Lowestoft" (B.).

Mytilus edulis, Linn. Mussel.—C. The Yare and the channel on Breydon are in places literally "paved" with this species, dredging

for which formerly constituted a remunerative occupation to many men in the winter months, among the shrimpers and certain "Breydoners," but, owing to the representations of several local doctors and the Medical Officer of Health, the practice was discontinued. It was alleged that certain cases of poisoning and numerous typhoid outbreaks were traced to the eating of river-taken Mussels. It can hardly be expected, with the abominable pollution of the local waters by sewage, this mollusc could remain untainted. Swarms of small Mussels are attached to the pier-piles at Gorleston, and any vessel long afloat in the harbour becomes swarmed with Mussels and Acorn barnacles (*Balanus balanoides*). A few bags of Mussels are sometimes sent away for bait, and latterly a quantity have been sent away to the Blakeney district, where the water is sufficiently pure for their culture.

Modiola modiolus, Linn. Horse Mussel.—C. "Common in drift-sand, and on seaweed" (B.). Large examples are not often found, although after strong northerly gales the roots of the oar-weed (*Laminaria digitata*) are sometimes seen with one valve attached. I have received small examples from the shrimpers. After a rough series of winds pecks of empty shells were, in company with hundreds of Starfish (*Uraster rubens*), thrown up on the beach early in April, 1902.

Nucula nucleus, Linn.—F. Several have been brought me by the local shrimpers.

N. nitida, Sowerby.—Found by Messrs. Harmer. Very common at Lowestoft.

Montacuta bidentata, Mont.—"In drift" (B.).

Loripes lacteus, Linn.—R. "One specimen, Gorleston" (B.).

Cardium exiguum, Gmel.—(H.).

C. edule, Linn. Common Cockle.—C. Numbers are found on Breydon flats, of small size, about six or seven inches below the surface, a few occasionally being found at the top under the *Potamogeton*. It seldom grows larger than a filbert-nut, and is never gathered by the boys who in summer go "winkling." The Curlews and diving Ducks that frequent Breydon in severe weather undoubtedly do collect stray specimens. Some years ago, by accident, a very plentiful "lay" of Cockles was found in a sandy stretch by the river-side off Gorleston, which, upon discovery, was allowed no rest until the colony was entirely extirpated.

Tapes pullastra, Wood.—(H.).

Tellina balthica, Linn.—C. "After a gale the empty valves are plentiful on the beach" (B.). The shells found are usually quite polished by the action of the sea. A few sometimes seen containing the animal. This species is met with on Breydon.

T. fabula, Gron.—(H.).

Donax vittatus, Da Costa. — (H.). I have received a few from the shrimpers.

Macra stultorum, Linn. Radiated Trough Shell.—C. In December, 1899, after a strong wind and a scouring tide, bushels of this species were washed up on Gorleston beach. Undoubtedly this mollusc offers great attractions for the flocks of Scoters which occasionally frequent this coast all the winter. I have had examples from the shrimp-nets, and in the winter of 1901 found some large valves near Gorleston Pier.

M. solida, Linn., var. *elliptica*.—(H.).

Scrobicularia nitida, Müll.—F. C. Harbour mouth.

S. alba, Wood.—“Few, harbour mouth” (B.).

S. piperata, Bellon. — C. Abundant on Breydon. The empty valves, protruding from the mud in all directions, give the flats in certain lights a very remarkable appearance. Living examples are found a few inches below the surface.

Solen siliqua, Linn.—O. After gales a few empty valves are thrown up on Caister beach. Some years ago several hundreds were cast up alive; these drew together a great congregation of Gulls of various species, delighted to find so abundant and palatable a supply of food. Quite a sprinkling on beach, April, 1902.

Corbula gibba, Olivi.—(H.).

Mya arenaria, Linn. “Clam.” — C. Abundant on Breydon, but is never eaten, nor even used locally as bait. Mr. Southwell tells me it “is both eaten and used for bait by the Lynn people.”

M. truncata, Linn. — “Young only found. In drift” (B.). I met with a fine example, April 8th, 1902.

Saxicava rugosa, Linn.—O. (B.).

S. var. arctica, Linn.—(H.).

Pholas dactylus, Linn.—O. “In pieces of chalk” (B.). I have occasionally found this species in lumps of chalk that undoubtedly were originally used as ballast in vessels probably wrecked.

P. candida, Linn. — “Few washed up on Gorleston beach” (B.), (H.).

Teredo navalis, Linn. Ship-worm.—C. Was formerly exceedingly destructive to the Gorleston piles, and to those of the piers. The old laborious process of covering the lower parts of piling with flat-headed nails has been superseded by saturation of the timbers with creosote.

MARINE UNIVALVES.

- Chiton cinereus*, Linn.—“Scarce, harbour mouth” (B.).
- Patella vulgata*, Linn.—C. “Gorleston Breakwater” (B.).
- Helcion pellucidum*, Linn.—“In drift” (B.).
- Tectura virginea*, Müll.—R. “In drift” (B.).
- Trochus cinerarius*, Linn. Ash-coloured Topshell.—F. I have received examples from the shrimp-nets.
- T. zizyphinus*, Linn.—I have had examples taken in shrimp-nets.
- Lacuna divaricata*, Fabr.—“Occasionally in drift” (B.).
- L. pallidula*, Da Costa.—“Few occasionally in drift” (B.).
- L. var. gracilior*.—“One specimen, Yarmouth” (A. Mayfield).
- Littorina obtusata*, Linn.—“Harbour mouth” (H.), (B.).
- L. rudis*, Maton.—R. Have found this on Breydon, and had an example or two from the shrimpers.
- L. littorea*, Linn. Common Winkle.—C. Very fine examples are abundant on Breydon, on the stretches of *Potamogeton*. All through summer boys, and men occasionally, gather these, and sell for food. Myriads of the smaller shells, with *Hydrobia* and others, are gathered by the action of the tides and eddies into angles in the walls, known locally as “shell corners,” and on a small scale form copies of the crag formations.
- L. neritoides*, Linn.—C. “Common on Breydon walls under the bladder-wrack” (B.).
- Rissoa parva*, Da Costa.—R. “Drift” (B.).
- R. var. interrupta*.—C. “Abundant in drift” (B.).
- R. inconspicua*, Alder.—R. “Rare on seaweed” (B.).
- Hydrobia ulva*, Penn.—C. Every blade of *Potamogeton* is in summer swarmed with this species. Various shore-birds and *Palmipedes* feed in turn upon it.
- H. ventrosa*, Mont.—C. “Common on Breydon” (B.). “Plentiful in a ditch near Breydon” (A.M.).
- H. var. pellucida*.—Breydon (A. M.).
- Odostomia unidentata*, Mont.—“Rare. Drift” (B.).
- O. dolioliformis*, Jeffr.—“Rare. Drift” (B.).
- Natica catena*, Da Costa.—F. C. Several examples brought me by shrimpers.
- N. alderi*, Forb.—O. Brought me by shrimpers.
- Cerithium reticulatum*, Da Costa. R. “Harbour mouth” (B.).
- Purpura lapillus*, Linn.—F. Breydon. Several also brought me by shrimpers.
- P. lapillus var. imbricata*.—(H.).

Buccinum undatum, Linn. Whelk. — C. Frequently taken in shrimp-nets. Also "on cod-lines" (B.).

Murex erinaceus, Linn.—F. Taken in shrimp-nets.

Fusus antiquus, Linn.—O.

Nassa reticulata, Linn.—R. (B.).

N. nitida, Jeffr.—"Few" (B.).

N. incrassata, Ström.—(H.).

Pleurotoma rufa, Mont.—(H.).

P. turricula, Mont. — R. (B.). I have had one or two specimens from a shrimp-boat.

Utriculus obtusus, Mont.—"In drift" (B.).

CEPHALOPODA.

Sepia officinalis, Linn. Cuttlefish.—O. Occasionally flings itself ashore; more often taken in the nets of the wolders and shrimpers. Sometimes great numbers of the "bones" washed ashore.

Octopus vulgaris, Lam. — R. Is occasionally taken. A fine example entangled in a "drift" herring-net, October, 1901; another, whose body was the size of a lemon, netted in 1902. This is rather unusual with such deep-water species.

Loligo vulgaris, Lam. Squid. — O. Now and again found on the beach.

Sepolia Rondeletii, Leach. Little Squid. — Numbers taken in the shrimp-nets every year.

FRESH-WATER BIVALVES.

Sphærium corneum, Linn.—Common. Ditches on North Denes (B.).

Anodonta cygnea, Linn. Swan Mussel. — C. In Lound Reen, Fritton, Filby, and other broads; indeed, it is universally distributed.

Pisidium amnicum, Müll.—C. Abundant in dykes (B.).

FRESH-WATER UNIVALVES.

Paludina vivipara, Linn.—F. I have met with this species on the Bure, and in ditches at the west end of Caister.

Bythinia tentaculata, Linn. — O. "North Denes and Southtown ditches" (B.).

Planorbis vortex, Linn.—C. "North Denes and Southtown" (B.).

P. complanatus, Linn.—C. "Common in dykes north of the town" (B.).

P. corneus, Linn.—C. Common in Southtown ditches.

Physa hypnorum, Linn.—R. Found "near 'Spotted Cow'" (B.); and Southtown marshes.

Limnaea peregra, Müll.—C.

L. stagnalis, Linn.—C.

L. palustris, Müll.—C.

LAND SHELLS.

Arion ater, Linn.—C.

Limax agrestis, Linn.—C.

L. maximus, Linn.—C.

Succinea elegans, Risso.—O.

Zonites cellarius, Müll. — F. Mr. Beckett gives localities, Tower Road and Burgh Castle.

Z. nitidulus, Drap.—“Caister and Bradwell” (B.).

Helix aspersa, Müll. Common Snail.—Most abundant.

H. nemoralis, Linn., *H. hortensis*, Penn.—Abundant, but extremely local in their habitats. After a heavy dew, or on a very damp morning even after sunrise, the herbage on Breydon walls, within easy reach of the salt spray, is found covered with varieties of *Helix*. The furze on the North Denes used also to abound with the species, and after a bush has been burnt many shells with fire-dried bodies inside are exposed to view, sometimes with a dead Lizard or two amongst them. Mr. Beckett enumerates seven varieties. Careful search would undoubtedly add many more to the list.

Pupa umbilicata, Drap. — F. Mr. Beckett refers to examples brought him from the neighbourhood of the River Bure.

Clausilia rugosa, Drap.—O.

NOTES AND QUERIES.

MAMMALIA.

Notes on the Stoat (*Mustela erminea*) and Weasel (*M. vulgaris*).—Have any readers of 'The Zoologist' noticed how much smaller white or pied Stoats are than those of the normal colour? Nearly all those I have examined in this state have been females. Mr. Lydekker, in his work on the British Mammalia, gives the length of an adult Stoat as—body $10\frac{1}{2}$ in., tail $6\frac{1}{2}$ in. Two specimens I have in my collection in winter dress, taken in Surrey, measure, from tip of nose to end of tail, $10\frac{1}{2}$ in. and $11\frac{1}{2}$ in. I have also a fine male in summer dress, which measures 20 in. On referring to the Weasel, Mr. Lydekker says:—"Occasionally, though very rarely, the Weasel is stated to turn white in winter, the tail then retaining its reddish hue, although becoming paler than ordinary." I have the skin of a very small female Weasel, measuring $7\frac{1}{2}$ in., taken in Russia, which is pure white throughout.—GORDON DALGLIESH (Clairval, Collings Road, Guernsey).

AVES.

Note on the Sedge-Warbler.—It is well known that the Sedge-Warbler (*Acrocephalus phragmitis*) is generally to be found in sedgy and marshy localities in the immediate neighbourhood of water or stream. I have, however, noted that about the time of this bird's arrival in spring, viz. about the first half of May, it may be met with not unusually in dry thickets or hedges, quite remote from any water or marsh. I have observed it then in a garden shrubbery quite a mile from the nearest spot which might be thought suitable to its habits. Last year a pair nested in a small thick copse in this neighbourhood, in a very dry spot, quite half a mile from the nearest water. This copse is on a chalky upland, nearly two hundred feet higher than the valley of the River Beane, where this bird is common. I had heard the birds singing in the thickets for some weeks, and ultimately found their nest in a dense growth of nettles surrounded by hazel and hornbeam scrub. It contained three eggs, and I saw both the male and female close to the nest.—ALLAN ELLISON (Watton, near Hertford).

White Wagtail visiting Bartragh Island, Killala Bay.—It will be interesting to ornithologists to hear that *Motacilla alba* has this season visited the island of Bartragh on April 27th; two birds were seen, and one specimen obtained by Captain Kirkwood, which I have forwarded to my old and valued friend Mr. W. Oxenden Hammond, of St. Alban's Court, Kent. As this is the sixth year in succession in which the visits have been recorded, since a regular look-out for the birds has been kept up by Captain Kirkwood, I think there can be no doubt but that a regular line of migration passes over Bartragh every spring, probably of birds going to Iceland. The birds are generally observed about the last week of April or the first week of May, and are especially seen if north or north-easterly winds are blowing, when the few birds visible are probably tired from flying against the winds, and pause on their journey to rest for a day, or for a few hours only, before resuming their northerly course. In my notes on the White Wagtail (Zool. 1898), I gave dates of occurrence for that year, which I need not recapitulate here, but give the dates for the five years since:—1899. April 21st, one bird seen in stable-yard; May 4th, one seen feeding about a manure-heap also in yard. 1900. April 23rd, one seen in the garden, but Mr. A. C. Kirkwood, being very unwell at that time, was unable to keep up his observations, which accounts for only the one bird being noted. 1901. May 12th, two birds seen in yard; 20th, one seen feeding on lawn outside parlour windows. 1902. May 8th, 9th, 10th, and 11th, several birds were seen by Captain Kirkwood. 1903. April 27th, two birds seen and one obtained by Captain Kirkwood. As there are none of the common Pied Wagtails on the island, *M. alba* at once attracts attention, and the light grey back and very white cheeks and neck are so conspicuous that the attention of the observer is at once directed to the bird.—ROBERT WARREN (Moyview, Ballina).

The Status of the Goldfinch (*Carduelis elegans*) in Britain (*cf. ante*, pp. 23, 70, 104, and 152).

South-east Dorset.—The Goldfinch has been increasing in the last dozen years, and especially in the last four or five. The other day a charm of sixteen was seen near Wareham.—ARTHUR BANKES (Leadenhall, The Close, Salisbury).

North Oxfordshire.—It should be stated that our resident Goldfinches, which are to be seen here in small charms at any time in the winter, are of the small dusky race. In autumn we are visited by large light-coloured Goldfinches, and it seems that some of these also come in spring to breed.—O. V. APLIN (Bloxham, Oxon).

Ireland.—A common bird in Ireland. In Co. Wicklow it is very numerous, and I used to find a dozen nests or more in the season within a small area. In Wexford and Carlow I have found it equally common. In the remoter regions of the west, except in the very mountainous parts, it is numerous wherever there are trees or bushes large enough to furnish nesting places; indeed, in some of the wildest districts, where trees are scarce, it is the commonest Finch.—ALLAN ELLISON (Watton, near Hertford).

Goldfinch in Australia and Tasmania.—In reading Mr. J. A. Harvie-Brown's interesting notes on the general decrease of Goldfinches (*Carduelis elegans*) throughout Great Britain, I thought it would be interesting to know that these little birds are rapidly spreading in other parts of the world; for instance, in many of the settled districts of Tasmania, especially round Hobart, they are very numerous, and at the present rate of increase will soon spread over that island. Then, again, in the southern parts of Victoria, Australia, they are exceedingly plentiful, especially in the gardens round about Melbourne and Geelong, and in the latter city often nest in the elms and other trees that are planted by the side of the street in the suburbs. Linnets are also plentiful, especially in the thick scrub round the shores of Hobson's Bay, by Melbourne. In the gardens round about Melbourne Blackbirds and Thrushes are numerous and steadily increasing; for instance, in my own garden this season several nests of both birds were found, and one pair of Thrushes reared two broods of three young each from the same nest, which is not usually the case. The European Starling can now be numbered by many thousands, and large flocks roost in these Gardens every night; and we wish they did not, as the mess made by about ten thousand birds is very considerable, and when they are moulting the ground is littered with feathers under their roosting-places. — D. LE SOUËF (Director, Zoological Gardens, Melbourne).

Ravens nesting in Co. Antrim.—In 'The Zoologist' for 1902, p. 194, I had the pleasure of recording the successful nidification of a pair of Ravens (*Corvus corax*) in Co. Antrim, not many miles from Belfast. Out of a nest of four young birds, I saw three on the wing with the parent birds about the middle of May; they then disappeared from the district, and were not seen again that season. About the beginning of March this year the parent birds returned, and immediately commenced repairing the old nest, which was completed, evidently to their satisfaction, about the 24th; up to the 26th no eggs were laid, and on the following day I was sorry to find a large piece of an over-

hanging rock had fallen and swept the nest with it to the ground. The poor birds, thus frustrated in their task by nature, are evidently not going to risk the same site again, as I have not heard of them being seen in the district since. I was fortunate in securing the accompanying photo of the nest. — W. C. WRIGHT (Charlevoix, Marlborough Park, Belfast).

[We have received the very interesting photograph of this nest.—ED.]

Carrion-Crow (*Corvus corone*) in the Irish Channel.—On March 31st, as I was crossing the Irish Channel from Dublin to Holyhead, I noticed a Carrion-Crow (*Corvus corone*) following astern of the steamer. When I first saw the bird we were still about twenty-five miles off the South Stack headland. It appeared to fly away from a large flock of clamorous Herring-Gulls which were greedily feeding on floating refuse. Whether the Crow was attracted seaward from the Holyhead district, where it is not uncommon, for the purpose of procuring food or not, it is hard to say. It leisurely followed the boat, being strong and buoyant on the wing; nor had it the appearance of a bird anxiously heading for its destination, overcome by migratory fatigue. In the distance I might have mistaken this bird for a Rook (*Corvus frugilegus*), but when it came several times quite close to the deck where I was standing, I could see by its characteristic flight and heavier build that it was undoubtedly a true *Corvus corone*. I may mention, in passing, that I am well acquainted with the flight of the Carrion-Crow, having often seen this species on previous occasions in different parts of England and Wales. When we came within three miles of Holyhead the Crow (which up till then had followed the vessel somewhat closely) left us, and steered for the land below the South Stack lighthouse. I watched it until it ultimately disappeared among the shadows of the cliffs. Although common in parts of England and Wales, the Carrion-Crow is extremely rare in Ireland, and it seems a curious fact that a few wanderers have not occasionally ventured across the Channel. This they may have done oftener than we think, as the Carrion-Crow is easily overlooked and confounded with the Rook. — CHARLES J. PATTEN (9, Summerfield, Broomhill, Sheffield).

Early Nesting of the Shag (*Phalacrocorax graculus*).—I was much interested in Mr. Raeburn's remarks on the nesting of the Shag (*ante*, p. 153). My experience with this species in the breeding season is very limited, but the following note will lend some support to the theory that the Shag is an early breeder:—In 1898 I was staying in Sark from March 22nd to 30th (*cf.* Zool. 1898, p. 274), and by the time I arrived the Shags, which are rather numerous on the island, had built their

nests, and some appeared to be sitting. I did not actually see any eggs in the nests, as most of them were placed in situations difficult of access, but I know that laying must have commenced, as on one occasion I saw a Raven, which had a nest and young near at hand, swoop down on a Shag's nest and fly away with one of the large white eggs in its bill.—F. L. BLATHWAYT (Monk's Legs Terrace, Lincoln).

Nesting of the Ringed Plover (*Ægialitis hiaticula*).—The nidification of this Plover is one of the most interesting adopted by British birds, interesting not only in itself, but in the light it throws upon the evolution or rather development in nest building of birds in general. In this neighbourhood the Ringed Plover builds at least three styles or classes of nests:—

Class 1.—What might be called primitive nests, *viz.* the eggs laid in a very slight depression, without any attempt to line the cavity. This occurs on smooth gravel banks, also on the rough shingle of the seashore.

Class 2.—The eggs laid in fields, the cavity of the nest lined with fragments of broken shells or small pebbles, sometimes both. In this case the nest was situated in a field of sprouting wheat quite five hundred yards from the seashore.

Class 3.—Is the most interesting. Constructed also in fields, where the eggs are laid on small pebbles, with a few twigs placed on the latter. There are also some twigs scattered about in the immediate neighbourhood of the nest.

This to my mind suggests the commencement of building with vegetable material, and to be only a few stages removed from the built nest described and figured (Zool. 1902, p. 28). In my experience the eggs usually lie with their pointed ends turned inward during the whole process of incubation, but there are exceptions to this rule, where one, two, or sometimes even three, point sideways. When a Ringed Plover is surprised on her eggs, she almost invariably runs some distance from the nest before taking flight. This run is comparatively short on the seashore, but when sitting in a field she runs further, sometimes two hundred yards at least, before flying. My experience coincides with Mr. Gurney's that the young are not hatched simultaneously.—J. E. H. KELSO (Southsea, Hants).

[Dr. Kelso has forwarded us some excellent photographs of these nests, which we regret we have not space to reproduce.—ED.]

Scolopax rusticula breeding in Kent.—It may interest some of the readers of 'The Zoologist' to know that in the second week of last

month (April) a Woodcock's nest was found in a wood in the neighbourhood of Orlestone, Kent. It had four eggs, which had to be taken, as the wood was being cut; they were all fresh and easily blown. Another nest was found with five eggs, which have been since hatched, and the young birds gone off. One of my keepers informed me that there was still another pair of Woodcocks about, and he supposed they must have a nest. We shot thirty-five Woodcocks last season, and left several in the hope that they would stay and breed. When shall we get a History of the Birds of Kent?—R. J. BALSTON (Springfield, Maidstone).

Variation in the Guillemot.—Mr. Saxby, in his very interesting "Ornithological Notes from Shetland," speaks of being puzzled by the black plumage of a Common Guillemot obtained last January, and that the Rev. Julian G. Tuck, to whom he sent the specimen, thinks it may be a hybrid between the Common and Brünnich's. I think they are both mistaken as to its being a hybrid, for I believe that the dense black-coloured plumage is the normal coloured winter plumage of the Common Guillemot. The first winter specimens of the Common Guillemot that I obtained in the month of December, for several years, also puzzled me, for, never before having seen one in that coloured plumage, I thought I had got a Brünnich's until I observed the slighter bill. Since then all the specimens that have come under my notice in winter invariably exhibit this black plumage, quite as deep and pure a black as that of a Razorbill or Brünnich's. I met with several specimens this winter thrown up dead on the sands of Enniscrone, and all were pure black-coloured, none showing the least trace of the sooty brown of summer.—ROBERT WARREN (Moyview, Ballina).

Birds killed by Ticks.—In reference to some previous notes under this heading (*ante*, pp. 108 and 155), I may say that unfledged nestling birds seem not unfrequently to suffer from the attacks of midges. I have noticed this especially in the case of young Greenfinches, which are often rather late in the summer in their nests, in shrubberies and gardens where midges are likely to be troublesome. I have seen these small but bloodthirsty insects satisfying their hunger from the bare bodies of the unfledged birds, and afterwards crawling about the nest distended with blood and unable to fly away. Indeed, the death of the nestlings has sometimes seemed to be attributable to no other cause but this.—ALLAN ELLISON (Watton, near Hertford).

NOTICES OF NEW BOOKS.

The Birds of North and Middle America. By ROBERT RIDGWAY.
Part II. Fam. Tanagridæ, Icteridæ, Cœrebidæ, and
Mniotiltidæ. Washington: Government Printing Office.

IN 'The Zoologist' for 1902 (p. 154) we had the pleasure of giving a short notice of the first volume of this extensive work. The second volume has recently reached us, and exhibits the same erudition, analysis, and completeness in reference and synonymy as its predecessor. But will a final word in nomenclature ever be accepted? Ornithologists are not alone to-day in the peculiar position of knowing practically all about a species, but with no certain rule as to its scientific name. We will take the Rose-throated Tanager as an example. The 'Biologia Centrali-Americana' cannot be considered an ancient work; most of us thought its nomenclature had reached maturity, and in it Salvin and Godman, in agreement with Mr. Ridgway in 1873, called this bird *Pyrranga roseigularis*. Now Mr. Ridgway entitles it "*Piranga roseo-gularis roseo-gularis*." Do we really gain by this mixture of archaism and modernness? We do not accuse the author of inconsistency; he has chosen his rule, and he faithfully follows it; his book is too important to be neglected; his authority too great to be ignored; but what name is a conscientious curator of an ornithological gallery to adopt, or a bewildered writer on general zoology to follow? Entomology is in the same condition. Douglas Jerrold, once writing to Dickens from Bath—or perhaps the names should be reversed, for we have not a handy reference—described that valetudinarian stone-built city as exhibiting a people who had risen from the dead, and built their houses with their tombstones. This archaic process in scientific nomenclature recalls that operation.

Variations in Animals and Plants. By H. M. VERNON, M.A.,
M.D. Kegan Paul, Trench, Trübner & Co., Ltd.

THIS book constitutes vol. lxxxviii. of the "International Scientific Series," and is devoted to a question which goes to the root of the most prevalent conception of evolution at the present era, for, as Wallace has remarked, "the foundation of the Darwinian theory is the variability of species." This variability has been hitherto recorded in a somewhat loose or impressible manner by different naturalists, whose observations have formed most of the bricks used in current theories and conclusions. The investigation has recently been pursued, and principally by friendly advocates, by an altogether different method, and we are now beginning to understand the teachings of a mathematical biology. This is likely to attain vast results, for, although few naturalists care for, and most naturalists dislike, figures, we have recently read in an American publication that, in the opinion of Dr. G. B. Halsted, about one in two hundred persons in America possessed some sort of mathematical genius, a mental condition probably not confined to that country. The work done by what we propose to call mathematical biologists is the careful measurements, weighings, &c., of long series of a single species, found in a special environment and under special conditions; the study of these by a mathematical process, and the results given in mathematical formula, thus providing for evolutionists a valuable material for biological statistics. Dr. Vernon has largely drawn on these data, and has thus focused very much valuable material in a well-arranged way in his discussion of the subject; in fact, his volume is a storehouse of collected information of facts obtained by workers who have followed this process. The author, of course, has also views of his own, to which we can only refer the reader, and we will conclude with a quotation with which many will agree:—"In spite of all that has been written to account for the almost universally present adaptation which we see in animate nature, there is still a lingering doubt in the minds of many men as to the entire adequacy of the explanations hitherto offered."

Catalogue of the Collection of Palæarctic Butterflies formed by the late John Henry Leech, and presented to the Trustees of the British Museum by his Mother, Mrs. Eliza Leech. By RICHARD SOUTH, F.E.S. Published by the Trustees of the British Museum.

THE late John Henry Leech was a wealthy and enthusiastic lepidopterist. It appears from the biographical notice which prefaces this volume that, after some desultory collecting, he settled down to a distinct faunistic work, which resulted in the publication of a great book, "Butterflies from China, Japan, and Corea." Had he lived, it is more than probable that the same course would have been pursued with the moths. The material which formed the basis of this work was not only the result of his own personal expedition to the Eastern Palæarctic Region, but also included the collections of other expeditions promoted and subsidized by himself. With a splendid example of scientific patriotism his mother has presented the whole of his Lepidoptera to our National Museum, where it is now being incorporated with the largest collection in the world.

This catalogue has been compiled by his intimate associate, Mr. Richard South, and details the sexes, aberrations, and varieties of each species. It is therefore a publication to be perused by all students of Palæarctic Rhopalocera, as it affords a clue to what may be studied in the entomological catacombs of our great Museum. A good portrait of Mr. Leech is given at the commencement of the volume.

EDITORIAL GLEANINGS.

MR. W. L. SCLATER is returning to Cape Town to resume his duties as Director of the South African Museum. He will be heartily welcomed back, as the reform and energy he has expended in the cause of South African zoology has not been unrecognized. In the course of a few years he has guided and superintended the rearrangement of the collection in the new museum building at Cape Town. A series of volumes devoted to the fauna of South Africa has been commenced; four volumes have appeared, two of which are entirely and one largely dependent on his pen. The "Annals of the South African Museum" has also been founded, and two volumes completed. This is a worthy record. The position of Director of the premier Museum of South Africa is a responsible one, and is virtually at the head of zoological science in South Africa. A great feature of our colonial communities is their ever-increasing scientific independence, and this is becoming more pronounced every year. No longer is the greater part of the zoological work of South Africa published in London; the Museum at Grahamstown, now under Dr. Schonland, also inaugurates its own annals. The same thing is true as regards Zoological Gardens. Those at Pretoria are best suited for Ethiopian animals, in both climate and soil, and fewer South African rarities will probably reach Regent's Park in future years. The work of our London societies is likely to become of a more philosophical nature, while the real faunistic work will become more and more to be found in colonial publications.

It is quite a pleasurable surprise to find biology once more a subject matter for the 'Quarterly Review,' and in the January issue—a number very far removed from a weak one—not the least important contribution is devoted to the question of "South American Animals and their Origin," and bears the signature of R. Lydekker. The discussion is confined to the mammalian fauna, and is conducted on both zoological and palæontological principles, and clearly demonstrates the peculiarity of the South American mammalian fauna as a whole, and its divergence from that of any other part of the world. The theory

of its primitive isolation is attested by facts, and, to use the words of the author, "during the deposition of the bone-bearing formation at Santa Cruz, South America formed an isolated continent, perhaps still partially connected by chains of islands with Australia or South Africa, or both. Here flourished in undisturbed possession of the country the ancestral Spider-Monkeys, Marmosets, Glyptodons, Armadilloes, Ungulates, Rodents, and Selvas, some of which developed into their gigantic successors of the pampas period, while others, like the Astrapothere and Prototheres, died out without descendants. Subsequently the North and South American continents became connected, and a mammalian invasion from the north, and some migration from the south, is the almost certain story derived from zoological and palæontological evidence." Mr. Lydekker has given a full review of our latest information on the subject, and the pages are illustrated by four plates.

WE much regret the death of Prof. J. Victor Carus, which took place at Leipsic, in the eightieth year of his age. Apart from his eminence as a zoologist, he was perhaps better known as the editor of the 'Zoologischer Anzeiger,' a position he held from the commencement of that journal in 1878. He always took a very friendly interest in 'The Zoologist,' and it was in deference to his wish made a few years ago that we have since endeavoured to give the scientific as well as the popular names of animals referred to in our pages. Our contributors seem sometimes to scarcely realize that they are read by many nationalities, and that our British or *popular* names for animals can scarcely be recognized by foreign zoologists.

THE announcement has been received from Tiflis of the death of M. Gustav Radde, the well-known naturalist and director of the Caucasian Museum and the public library of Tiflis. His biological work was principally connected with the fauna and flora of the South-western Caspian region; he also published accounts of his travels on the Russo-Persian frontier.

THE 'Neue Freie Presse,' Vienna, publishes an interesting article on a recent addition to the Schönbrunner Menagerie. The pair of Wild Oxen, which have arrived at the Schönbrunner Menagerie as a present from the Russian Emperor, are to be seen now in the finest

condition after recovery from the fatigues of the journey. They are a male and female of the European Bison (*Bison europæus*), also known as "Wisent," a near relative of the American Bison, but not, as is occasionally stated, Aurochs. The Aurochs, or Ur, with the exception of those preserved in a single Polish game-park, had already died out in the seventeenth century. The Austrian Ambassador, Freiherr von Herberstein (died 1566), had yet seen both Aurochs and Wisent living side by side in Polish menageries, and in his work, 'Rerum Moscoviticarum Commentarii,' has left us pictures of both species. Later the name "Aurochs" was applied to the Wisent of Lithuania. In the latter half of the last century this mistake was corrected, and it was made evident that the Aurochs and Wisent were quite distinct species of Wild Oxen. A semi-wild descendant of the extinct Aurochs may be the park cattle of the North of England, which have been carefully preserved for six hundred years by the rich territorial families in the enclosed forest parks of Chartly, Chillingham, and Cadzon Forest. The Wisent also is in process of extinction. It only remains in a wild state, strictly protected by game-laws, in a vast State-farmed district, covered with beech and pine, on the Bielaja and the Laba in the Caucasus. In these high valleys it lives at an altitude of between four thousand and eight thousand feet, and only comes lower down in the winter. For many hundreds of years the Polish kings and wealthy *voevodas* preserved them in large parks at Warsaw, Zamosk, and Ostrolenka, all of which were broken up in the time of the wars. A single such Wisent preserve still remains, in Russian Lithuania, in the woodlands of Bialovitza. Here the Wisent lives in herds of about twenty-five strong in a semi-wild state, carefully guarded by foresters. There are perhaps one thousand five hundred Bison, here and in the Caucasus, that prolong their contemplative existence, and in spite of all protection steadily dwindle. At the commencement of the eighteenth century the Wisent was still fairly numerous in the border forests between Poland and Prussia. There it was attacked by a contagious disorder, communicated through contact with tame cattle, which soon put an end to its continuance. Only in the larger zoological gardens, as in Berlin, do the European and American Bisons thrive satisfactorily. Specially deserving of mention, however, is the Wisent herd of Prince Pless in the Mezerzitzer Forest in Upper Silesia, where some Wisents received from the Bialovitza Forest have already increased to seventy head.—*Westminster Gazette*.

